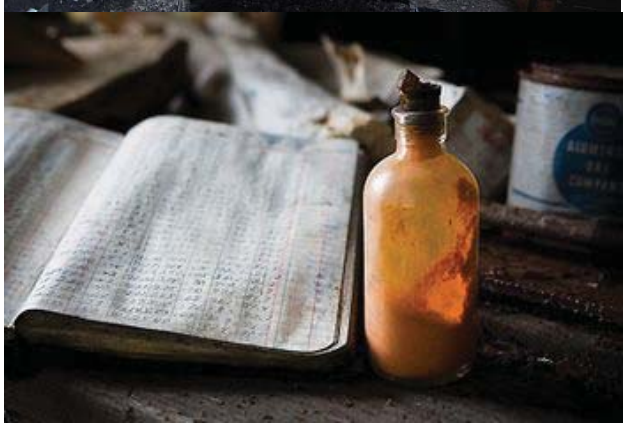
Solvay Coke And Gas

Milwaukee, WI.



LA 572 Design Thesis

Primary Advisor: Jason Kost

Brad Nordling

May, 2011

DESIGN THESIS

A Design Thesis Submitted to the
Department of Architecture and
Landscape Architecture
of North Dakota State University

By:

Brad Nordling

In Partial Fulfillment of the
Requirements
for the Degree of
Bachelors of Landscape Architecture

_____

Primary Thesis Advisor

_____

Thesis Committee Chair

May 2011
Fargo, North Dakota

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Thesis Abstract

This project is meant to explore the idea of how heavy agriculture and food industrial zones can have a smaller carbon footprint than existing industrial sites across America. The idea is to use sustainable design to minimize the polution rate. The City of Milwaukee has plenty of unused industrial sites that were once thriving with business and now sit in peril. The buildings once used are now sitting in disrepair and causing health and safety issues. Apart from these structures, the site is completely abandoned and unused and has the possibility of growing into a successful model. The goal and vision of this site is to bring the very important industrial era back to life with positive capitol and a small footprint.

Problem Statement

How can the heavy pollution of the agriculture and food industy work be lessened through sustainable design?

Project Typology

This is in an urban setting just outside downtown Milwaukee and will deal with industrial planning and site design. This abondoned industrial site is surrounded by similar activities and low income housing. The goal will be to change how the industrial industry is looked at .

The Claim

Industrial projects are an unerlying problem in todays culture with environmental issues that are often overlooked.

Premises

Because of the operation and design of industrial landscapes in America, it will call for a new approach to planning and design.

Theoretical Premise/Unifying Idea

The basis behind this project is that Milwaukee and other industrial cities are causing the largest carbon footprint in the United States ("Carbon footprint rating," 2008). New design geared towards sustainable solutions can reduce the total footprint being created. With a fairly new type of industry, The Green Industry, carbon footprints and elements put back into the environment can be healthier.

Project Justification

I believe the industial industy is one that America relies on everyday of the year. With a smaller footprint and smart design choices, these everyday actions can be done more efficiantly, while including the surrounding community in the design.

Proposal

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Narrative

What goes on behind the scene is often forgotten. When a machine is running without a critical internal piece not seen to the eye, it fails; when a pen is out of ink, it does not write; and when a light fixture does not have a bulb, it does not shine.

The industrial world is often put into a sentence just like the ones previously. It is often a forgotten asset that people across the world rely on every day. Without industry, we cannot survive. The big issue is that it is rarely a forgiving source to the environment. It offers foods and goods but puts a price on the health of the environment. I think by using sustainable and theoretical methods, this issue can be forgotten and a model design can be implemented throughout the world.

User/Client Description

The City of Milwaukee is the current owner of this empty site. Similar industrial sites form three of the directions while a residential neighborhood occupies the other. Depending on designated land use, the new users will be workers in the agriculture, mechanic, and skilled tradesman business. Depending on the number of structures built, this will decide on how many new jobs could be created and how many new or existing residents could be brought to the area.

Major Project Elements

This site covers a small portion of the current heavy industrial zone. Two main scales of design will take place on the site; site scale and a universal scale.

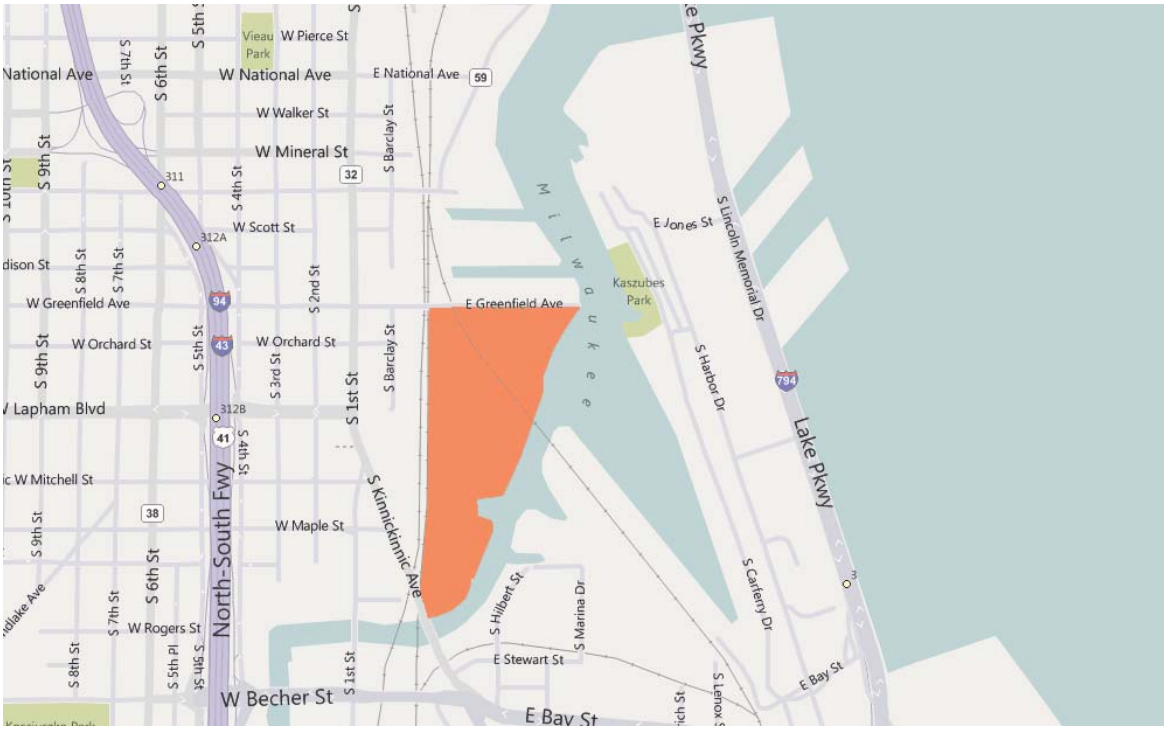
Site Scale:
This aspect of scale will require more detail than the universal scale. More detail will be put into site specific design. This will include but not limited to, sustainable practices, building layout, plant selections, and landscape design.

Universal Scale:
This is where certain elements or ideas can be put into use in other location across the globe. These can include, sustainable practices, approaches to use of industrial sites, safety issues, and circulation of different vehicles.

Site Information

The current site is located a short one mile south of downtown Milwaukee, Wisconsin. It is a small portion of the current heavy industrial zoning district. The site was previously an offload and loading site for the grain business. The site has potential to again be used in the same industry because all the major ammenities are already present. Current waterways give access into the site for ship and existing roads offer pedestrians and employees to gain access. Located off of the freeway, entrance is an ease. The borders of the site are East Greenfield Avenue, a railroad, and canal from Lake Michigan.

This site is of particular interest because of my previous affiliation within the agriculture business. Other sites such as this may have the same problems and this can act as a model for similar sites with similar issues.



Project Emphasis

The way current industrial zones are used are looked down upon by certain groups of people. The development of this site can act as a model to other sites with similar problems. Site pollution and the carbon footprint can be reduced by simple changes to the way the business is done. By implementing sustainable practices and tackling the issues, current employees and surroundings residents can benefit from the design.

A Plan for Proceeding

For further development of design and common occurring issues will require additional research into other industrial sites and other areas with common problems. History of the site will also need further research to determine previous uses and the uses of surrounding property.

The master plan created will be taken into two different scales, site specific and a universal scale. When at the site level, design aspects will go into detail and provide specifications towards choice of materials. The universal scale is where design and implementation ideas will be used in different areas in similar sites.

When the use of design and research are put together, I will able to complete my design thesis according to my theoretical premises.

Previous Studio Experience

Second Year - Fall Semester - 2006
Kathleen Pepple

Kennedy court - Fargo , ND
Walster Hall - NDSU Campus
Klai Hall - NDSU Campus

Second Year - Spring Semester - 2007
Mark Lindquist

Pioneer Park - Valley City, ND
Point Douglas Neighborhood - Winnipeg, Manitoba
Ready-Mix Concrete Design Competition

Third Year - Fall Semester - 2007
Stevie Famulari

Fargo Dike and Island Park - Fargo, ND
Symphonic Alley - Fargo, ND

Third Year - Spring Semester - 2008
Kathleen Pepple

Greenway Neighborhood - Fargo, ND
Lions Club Park - Battle Lake, MN

Fourth Year - Fall Semester - 2008
Mark Lindquist

Sandy Boulevard Streetscape - Portland, OR
Waterfront Park - Protland, OR

Fourth Year - Spring Semester - 2009
Stevie Famulari

Acid Canyon - Los Alamos, NM
HESCO Basket Flood Mitigation Design Competition - Fargo, ND

Fifth Year - Fall Semester - 2010
Katherine Wiley

Sheyenne National Grasslands - McLeod, ND

Program Document

Results from the Theoretical Premise/ Unifying idea

Sustainability
Waste Products
Food Consumption

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6th & B Garden
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Research Results and Goals

A common definition of sustainability deals with policies and rules that will fulfill today's needs without endangering the future generations to live a suitable life. This is the basic idea of how the word sustainability fits in with today's design process.

When the Environmental Protection Agency (EPA) was started, it acted as the protector and savior for the nation's environment to make sure businesses are following written legal requirements concerning pollution. To control all of the regulations and requirements took a lot of time, money, and additional resources.

As time went on and time, money, and resources were spent, the EPA started to shift away from pollution control and moved onto pollution prevention. Preventing a problem makes more sense that waiting until it's too late. Certain market based instruments such as Acid Raid and NOx Budget Trading were created to help businesses not only meet but exceed environmental requirements.

The EPA makes it their mission to apply sustainability to future generations by "researching science and technology, applying government regulations and policies to protect public health and welfare, and promoting green business practices." ("Sustainability," 2010)

Today EPA aims to make sustainability the next level of environmental protection by drawing on advances in science and technology, applying government regulations and policies to protect public health and welfare, and promoting green business practices.

Research Results and Goals

The National Environmental Policy Act (NEPA) was established in 1970 and was set forth with the goal of keeping a positive relationship where human and nature interact and "can exist in productive harmony, and fulfill the social, economic and other requirements of present and future generations of Americans." ("Sustainability," 2010)

Going over the last 40 years, people have evolved their perspective on sustainability. Now they are thought into two diverse sectors, public and private. From a public perspective, sustainability is defined as "the satisfaction of basic economic, social, and security needs now and in the future without undermining the natural resource base and environmental quality on which life depends." ("Sustainability," 2010) From a business stance, the main goal is to increase the shareholders social value, all while limiting and reducing the industry's use of its materials and lowering negative impacts on the environment.

Similar to the needs of public policy and the business perspective, is "the need to support a growing economy while reducing the social and economic costs of economic growth." ("Sustainability," 2010) The development of sustainability can hold additional policies that integrate environmental, economic, and social values in decision making. Moving towards the business side of things, the focus moves towards collecting system dynamics, building resilient and adaptive systems, anticipating and managing variability and risk, and earning a profit.

Overall, the progress of sustainability doesn't reflect the trade-off between business and the environment but the collaboration between them.

Research Results and Goals

Sustainability is going to be a large portion of my proposal. I believe when starting any new project, sustainability should be one of the first factors to relate to the design. I believe that it is not only one of the hottest topics in all aspects of design but when sustainable systems work towards saving the environment, users will be more likely to visit the site and getting funding will be more probable.

Building structures and machines that reuse their own waste is always a good practice and can be beneficial but getting the general public involved in using the waste products for different and more useful purposes is a challenge. The goal for the site will be to be one hundred percent sustainable with waste products and include LEED standards.

With all sustainable projects, standards and regulations have to be met. The Leadership in Energy and Environmental Design (LEED) provides verification that buildings or communities were built with the correct methods to complete certain objectives such as, energy savings, water efficiency, CO2 emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts. ("Leed," 2010)

LEED was developed by the United States Green Building Council (USGBC), it gives owners and operators an outline on how to identify and implement green building design, construction, operations and maintenance solutions.

Research Results and Goals

Waste products are materials such as animal products, plant materials, water, metals, or foods and come from certain manufacturing processes, chemical reactions, or biochemical pathways. These by-products are not the main creation being produced but the waste or leftovers. These materials can either be something marketable or be considered a waste product.

By products can come from a number of different sources and processes. Slaughterhouses will provide collagen and gelatin, used in many foods com from boiled skin and other body parts of animals, feathers from poultry, lanolin, used for personal cosmetics come from cleaning wool, or manure from animals. Certain types of vegetation by-products also exist and are used in different ways. Glycerol from producing bio diesel is used in food products and cosmetics, fruit and vegetable oils come from the unused peels, sawdust from logs at a wood mill can be reused in making new types of lumber or as cleaners.

Reusing by-products is one of the easiest ways to be sustainable. Most modern manufacturing processes such as metal forging, food production, or common appliances reuse excess material for making additional products that are already being made. Finding a way for the public to be involved in this process makes projects and sites more interesting. Letting people be a part of the initial process of manufacturing certain products can be initial steps to educating the public on how much material is either going to waste or being recycled. I believe one of the biggest and most important steps in becoming sustainable and getting others to think the same way is education. If such a place exists, steps to becoming a more sustainable world can take place.

Research Results and Goals

There is no doubt about it that food consumption has risen over the years. (U.S. Census Bureau, 2007) Eating food is one of the many things that keep us alive. It is an easy task to get in the vehicle, drive to a restaurant, order food, and eat. Ordering food over the phone or internet is also just as easy. When ambitious people want grow their own food, they begin to understand how much work can actually go into preparing a meal. This begins to hint towards the practice of urban agriculture and being a sustainable figure in the growing trend of growing your own food.

Urban agriculture has a fairly simple definition of "the growing of plants and the raising of animals within and around cities." (Resource Centres on Urban Agriculture and Food Security) This is not a new practice. Archaeologists are constantly finding large and small scale findings of practices of urban agriculture in ancient cities. (Mougeot, 2006) The difference between urban agriculture and traditional or rural agriculture is that urban agriculture becomes a part of the urban economical and ecological systems. The fact is that urban agriculture directly interacts with the urban ecosystem. Local amenities are used such as labor work or resources like compost and rainwater. Urban agriculture has been around since traditional agriculture was adopted. As cities grow, so does the idea of urban agriculture.

Research Results and Goals

Certain people are often involved in this practice than others, usually lower income individuals or families often due to economical situations. Locations of practicing urban agriculture can include intercity such as personal property, towards city limits on public or private land, or public lands such as parks, school yards, hospitals, roadsides, or along streams. The most common product of urban agriculture are food products. These can include grains, root crops, vegetable, and fruits. Animals such as poultry, rabbits, goats, sheep, cattle, pigs, and fish can be products of urban agriculture. Other types of products such as aromatic and medicinal herbs, ornamental plants and tree products can also be included. Products grown are typically not going to be found readily in the current area. ex. A family in Nebraska probably will not grow corn or a Florida resident would not likely grow oranges.

Urban agriculture can also be seen as an economical activity. Produce or livestock can be sold for profit to local grocers or local residents. When activities take place on public land, it promotes users and the community to work together and encourages teamwork.

Research Results and Goals

Project Type: Sustainable, environmental and Educational museums

Location: Provence of Jaén, Spain

Size: 10 ft² - 100 acres

Distinguishing characteristics: takes existing green space and turns them into outdoor museums for gaining knowledge.

Program Elements: This project deals with three main elements. They are Environmental Management, Civic Engagement and Cultural Vitality, and Urban and Regional Planning.

Research Findings:

The goal of this project was to give another meaning to the conventional idea of a green space of our cities to create a new product more attractive to the citizens. This is where the Ecopark comes in. The Ecopark is an outdoor museum and the main goal is for people to have fun and be educated about sustainability. The definition is described by the Head of Sustainability for the project as, "as a space demonstration of good environmental practices, providing a learning environment and sensitizer, which invites to acquire healthy habits and contributes to the maintenance and conservation of biodiversity and natural resources." (European Union, 2010) When designing, they want to move away from the idea of a green space being only decorative.

images courtesy of: http://www.ciudad21.org/historico_dossiers.php?pagina

Research Results and Goals

They want to offer services to citizens, aesthetics, educational, health and functionality, being sustainable in both the planning and in their implementation of ideas and maintenance of the site. This project idea has been implemented in 74 local authorities in the province of Jaén, and spread over six districts.

Each Ecopark has a number of "minimum requirements" to meet in order to be called an Ecopark such as, sustainable waste management, (Contains disposal locations, composting) sustainable maintenance, (optimal watering, energy and water saving) environmental education, (information of services provided, awareness to visitors of respect for nature, biodiversity) conservation of urban biodiversity, (installations of nests for wildlife, native plantings) and quality of life and healthy habits (installation of healthy itineraries and playful spaces for children). By having all of these aspects in good condition, "it can improve the quality of life for the citizens." (European Union, 2010)

images courtesy of: http://www.ciudad21.org/historico_dossiers.php?pagina

Research Results and Goals

The main reason for introducing Ecoparks to the province of Jaén is due to the fact that almost 50% of the municipalities have very little green space (less than 5 m2 per capita) and most design, location, operation, and maintenance is not done with sustainability criteria. (Best Practices and Local Leadership Programme, 2010) The main expected users are the young and elderly.

I know that this will go well with my research due the fact that the main basis of the project is to move toward sustainable design and including many aspects. By having requirements set, it gives the public a better understanding on how systems work and what they can do to keep the environment running at full power.

This project relates well in an environmentally manner because the space and locations used are either sitting is disrepair or not being used. Letting these sites go unused is not a good practice of land use. Social aspects are present with the construction of the outdoor museums. It brings community members together to make a difference in how the community communicates with one another. Culturally this can be related to the family aspect of how Spanish families are close knit with each other and will make due with what is available to improve the quality of life.

Research Results and Goals

Images courtesy of: http://www.ciudad21.org/historico_dossiers.php?pagina

Research Results and Goals

Project Type: Sustainable, environmental and Educational, good practice

Location: New York City, NY

Size: 17000 ft^2

Distinguishing characteristics: Intersting history of how the site made it to it current location. Encourages many community members to be a part of the process.

Program Elements: Workshops, lectures, music, films, food production

Research Findings:

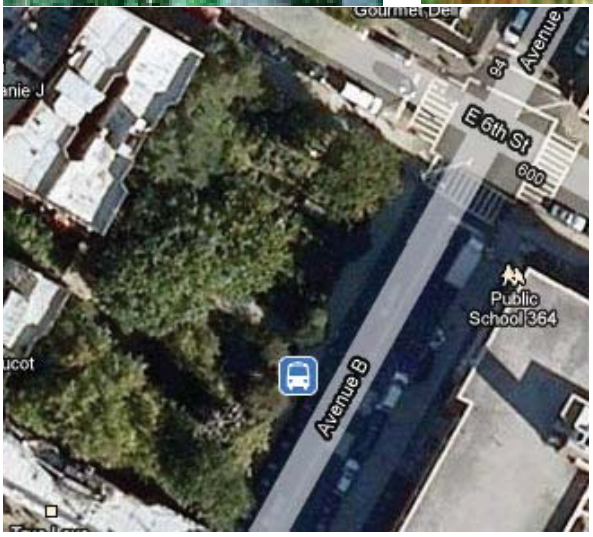
This site once was home hundreds of thousands of immigrants living in very poor living conditions such as small living quarters, poor air quality, lack of adequate light, and no green space. (Graywolf, 2010) During the 1960's it was now being occupied by students, low income working people, and Latinos. In the 1970's and 1980's, buildings were being abandoned due to the current energy crisis. Buildings were an eyesore and a safety issue so they were taken down and left empty. Members and volunteers started seeing the vacant lots as an important opportunity to restore some green to an overbuilt community. Before a lease was issued, a local garbage man petitioned the land to be used as a parking lot. For the year of 1983, the garden members were busy finding the best way a garden could fit on the site. The lease was finally granted and yet another problem arose. The garden was actually on city property and the city will sell to the highest bidder which will more than likely be a development company. By 1986, the community was forced to take a more flexible stance. The members kept the land out of auction for the next ten years. After a deal was worked out with the Trust for Public Land, the current site has the option to get a permanent site status.

Research Results and Goals

It was then transferred to the NYC Parks Department as part of the City Spaces Program. Over two hundred children utilize the garden weekly. Members pay dues for a 4x8 foot plot and must contribute four hours each month. The fence is designed by garden members, it represents the members "hands-on" contributions in creating the garden. (6BG, 2008)

When the members of New York City community saw vacant lots that were causing health and safety issues, they were proactive and stood up for something they believed would help the environment. As with all the case studies, doing projects that make a difference in the environment, social aspects in the community that may have been hidden start to come to the surface. It can take place on site, off site, in town, or over the internet. This project has a special cultural aspect that other projects may not. The history of the project tells a story by itself on how the way things are ran today versus the way the site was used at the beginning. Location changes of projects, especially when going to a better location, can be a stressful and scary process. It is a big test on how dedicated current members and users are towards the goal of the project.

Research Results and Goals



images courtesy of: http://www.6bgarden.org/
http://www.worldisround.com/articles/291617/photo37.html

Research Results and Goals

Project Type: Sustainable, environmental and Educational, good practice

Location: Vintondale, Pennsylvania

Size: 7.5 acres

Distinguishing characteristics:

Program Elements:

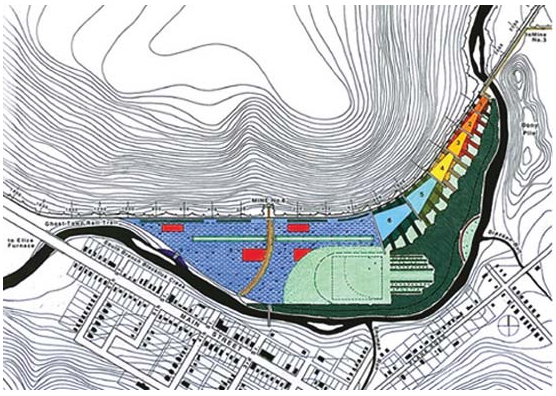
Research Findings:

In Vintondale, Pennsylvania, T. Allan Comp took an abandoned coal mine and turned it into a science and art project. After the coal companies left town, they left behind a poisonous discharge of sulfuric acid and iron know as acid mine drainage. Many streams in Pennsylvania ran orange with acid. Comp fixed this by using a series of passive ponds that would clean the water. Each pond has a specific use on what to clean. By thinking positively about a serious problem, Comp was able to improve health conditions. One interesting thing about this project is that visual goals of the project are able to be seen. Visitors can visibly see the water turn from a red-orange color to a more blue-green color. Along with the water changing colors, the trees along the edges of the pond are specifically selected for their fall colors to match the changing states of the water. Trees near the first pond will have a red fall color then to orange, yellow, green, and then blue-green. During the fall it is a celebration. Over one hundred volunteers worked together to construct Litmus Garden. (AMD&ART, 2007)

Over two days, 21,840 shovel-fulls of planting material was moved, 10,884 cups of fertilizer of lime was scooped, 2,184 wheelbarrows of fill was mixed, 907 holes were dug, 537 native shrubs and 370 native trees were planted, and 30 different groups such as AmeriCorps, Washington Center, U.S Office of Surface Mining, and Vintondale residents participated. (Green Museum, 2010)

This is a great case study towards my proposal for the simple fact that it brings the community together for a celebration. The cleaning process of the water will relate to the cleaning of the soil on site. Environmentally this project really stands out for the fact that the public health and safety are thought of as the most important aspect. The current situation at the time with the acid mine drainage was a big concern to the public. When projects such as this one are built with volunteers, it promotes the community to come together.

Research Results and Goals



http://ecosalon.com/20_unforgettable_works_of_environmental_art/
http://pruned.blogspot.com/2008/02/treating-acid-mine-drainage-in.html

Research Results and Goals

The interesting part about this project is that there are not many like it. The idea of taking multiple ideas such as sustainability, living machines, food production, and design will make for something interesting and new. These project ideas have been done before by themselves and have been considered successful projects but that is because the idea itself was so new and expectations were set low. A successful environmentally friendly site may achieve the project goals of cutting down on emissions or using native plants but may completely miss the idea of culture. The site would still be considered successful for the goals it was going for but not achieving aspects outside the normal realm of the project and may lack insight.

Relationships to social trends in our society today will play a large role in making my proposal successful. When new topics or ideas are released into the general public, everyone will want to be involved in the activity. When a new local band begins a good reputation, music lovers will listen because of the fact their new. Most Americans today will follow any new trend introduced to them and I am going to rely partially on that fact to make my proposal successful. By introducing multiple new ideas at the same time, several types of people can come together in one location and interact physically, socially, and culturally. The development of new buildings as "living machines" relates to sustainable design because both concepts are fairly new and as stated before, Americans will follow trends.

Research Results and Goals

Similar industrial zones surround the East side of the proposed site. These are currently in the Industrial Heavy Zone. (City of Milwaukee, 2010)To the South-West is the Industrial Light Zone and to the West and North-West is two and four family residential. The site is close enough to the downtown area so my goal of having residents participate in the design can be reached. There is on bike trail that crosses through the southern tip of the site. The Oak Leaf Trail features over one hundred miles of bike trails that connect different parks in the system. When riders need a place to rest, loops are placed in the trail and use off road paved trails, park drives, and city streets to offer the break. Users were having trouble orienting themselves with in the city so the parks department put together a multi-phase project of marking the trail. This project is being completed as funds become available. Basic rules of etiquette and safety apply to all users and are asked to follow. The Milwaukee River that currently runs through downtown connects to the Eastern edge of my site. During the warm months of the year, Milwaukee residents bring out the boat and cruise through downtown and occasionally stop at one of the many riverfront restaurants. Public tours are also running along the river and tells the history of the city. The main density of restaurants is closer to downtown. For boaters to fully experience the river there would have to be a separate entity for them to see away from the downtown area. Socially, as people start to drift further out of the downtown core, new friendships and connection can be made.

Research Results and Goals

Milwaukee, as many other cities, were first inhabited by Native Americans. To the Indians, they saw the great location of three river all coming to one point; the Milwaukee, Menomonee and Kinnickinnic rivers, and then releasing into what seemed like and ocean. Later that would turn out to be Lake Michigan. When the white man came across the land, they did not see it for its site specific location but rather saw it for the potential of business. They saw the expansion of industrial traits extending to the West to meet with existing similar traits. The streams, originally of interest to the fur traders because it allowed access to the city by canoe, were being developed with dock facilities, and were then expanded, and have become the focal point of a commercial and industrial harbor development. To the East meant for the potential of a new trait to the white man, fishing. Not realizing that the massive body of water to the East was not an ocean, but a lake, temperatures in the water were much lower that the ocean so fish tended to swim further from the surface. This posed a problem because when the fishing trade first started, the depth of the nets that were allowed to go under water were limited so it made catching the fish a harder challenge.

When immigrants from New England and New York came to the city, they had great hopes for a business opportunity. Opportunities that first came to mind were transportation, banking, insurance, and general commercial businesses. (Bruce, 1922) As industrial work started to grow, the city had to come up with ways to keep order in the city. Zoning for the city was a necessity for the city to continue to grow in a healthy way.

Research Results and Goals

Zoning is simply an extension of basic building codes and common interest. Two cities, New York City and St. Louis, had successful zoning plans and worked to benefit the residents. Milwaukee wanted the same success for their city so this is where Herbert S. Swan, New York City zoning consultant and Harland Bartholomew, city planning commissioner for St. Louis came in. These two helped create a successful zoning map for the city.

When the fishing trade was not as successful as originally planned, the East side became a harbor for trade. The first major improvement in converting the harbor from its original natural condition came in 1857, when the "Straight Cut" or new harbor entrance was completed. By completing this project, they had to move the actual location of the mouth of the Milwaukee River one half mile north. (Port of Milwaukee, 2010)

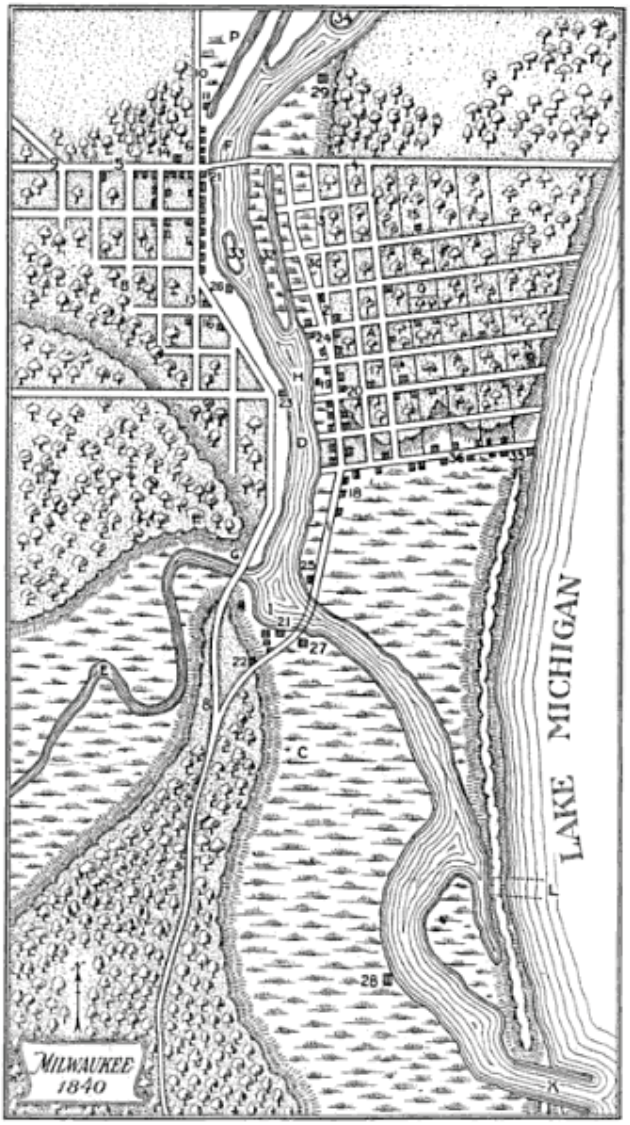
As business grew, the rivers were able to take the amount of traffic. Accidents were taking place and congress made provision to create a Harbor of Refuge in Milwaukee by the extension of a breakwater across the Bay, from McKinley Beach at the north, in a southerly direction; succeeding acts of Congress provided additional appropriations to complete the breakwater project. (Port of Milwaukee, 2010) In 1900, a new system of docks and terminals were constructed in the deeper waters of Jones Island (one half mile East of my site)

Research Results and Goals

Today, my existing site was once Solvay Coke and Gas. The site is approximately 46 acres and is zoned as heavy industrial. The site is a compilation of numerous sites and a variety of industrial activities have been taking place since 1900 or maybe as early as 1866. (USEPA, 2008)There was coke and gas facility located at the northern edge until 1983. Leather tannery's were located at the southern tip starting business sometime in 1884.

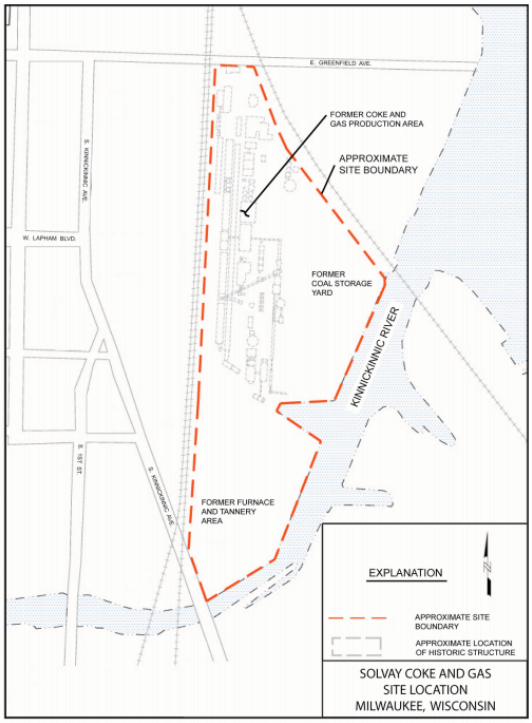
In October 2001, the U.S. EPA, Wisconsin Department of Natural Resources (WDNR), and the City of Milwaukee conducted a site investigation to check for any contaminants on site. When the report of the site investigation, it was determined that the site posted a possible threat on human health and safety. Substances found on site were arsenic, cadmium, chromium, copper, cyanide, lead, iron, mercury, benzene, and asbestos containing materials, just to name a few. (USEPA, 2008) These materials were found in old structure on site, pipes, storage tanks, drums, open pits, between walls, underground, and on the surface. The original cleanup order only called for removal of physical objects such structures, pipes, and storage tanks, but not any hazardous material below ground. This causes a problem because runoff from the site has the potential to enter the river and could cause health problems to humans and wildlife. Interviews conducted by the EPA in February 2008, said that many residents explained that there was a high interest in property and would like to see what the next activity on the site will be.

Research Results and Goals



Outline Map Of Milwaukee
Made in 1840

Proposed road plan of
east and west arteries



Solvay Coke and Gas
Site Location

Research Results and Goals

In the process of compiling a thesis manual and project with well thought decision and completing it, I will be satisfied. I will be able to take my research findings and use them in later projects to benefit the public. The goal of the project will be to create a sustainable model for other sites in which are in the same condition. I will also want to achieve community communication where ties may be broken. By using art, science, and design, I believe I will produce a positive solution to a dangerous problem.

Research Results and Goals

For site specificity, the academic goal will be to teach the public, from young to old, how sustainable living can go in different directions than just driving a hybrid. The goal will be to teach how different processes, such as making food or growing crops, are done from start to finish. The challenge comes from making these processes know to the passerby. This will be achieved through art and design.

Personal academic goals will be to produce a project worthy of a fully completed project. I will take my research and planning and put it to use after graduation. I need to understand that this project will be successful if I gain useful information that I can use to further my understanding of the field of Landscape Architecture.

Research Results and Goals

When graduated from North Dakota State University with my bachelors degree, I hope to get a job within the field. Routes to being successful may not be a strait path so I will have to make adjustments as they come. It will be my goal to become a licensed Landscape Architect and work in a small firm. Gaining experience and knowledge will be a never ending road. Finally, I would like to go back to school and earn my masters in Landscape Architecture.

Research Results and Goals

Personal goals of completing this thesis will to attain as much information as possible. Good grades may get you a job but it is what you know that will keep the job. I believe that receiving a bad grade on a project does not mean that the project or idea was a failure. If I gain knowledge that I can use in other situations, I consider it a success. Learning about different areas of study will help me in broadening my ways of thinking. Not all people work and think in the same way so I feel it is important to learn different methods of problem solving in order to as productive as possible. My involvement with the program and University have lead me to new and exciting opportunities and hope to continue to do so.

Site Analysis

On a hot day in the middle of June, 1980, the smell from the Solvay Coke and Gas fill my nostrils and the noise from the freeway flood my ears. Each day is the same as the previous. Wake up, make the bed, and go downstairs for breakfast. When breakfast is finished it is finally time to take advantage of the short summer vacation before school starts up again. When there are no activities to do, a group of my friends and explore to East of our neighborhood and into the heavy working world of our city. The smells get worse the closer you get. Many of my friends' fathers worked there so we would go see them on their lunch break. Coal was brought in everyday by boat and rail road. This was then put into electric rail car and then dropped into ovens and heated at high temperatures. When the carbon reacts with oxygen, it creates carbon monoxide, also known as coal gas. This is where the coke was produced and used as a fuel.
I have never understood the location of this business being so close to neighborhoods. Business was busy and at the end of the day, the largest item manufactured would toxins left in the soil and draining towards the river.

Today, the site has four main buildings and a trailer. Reports of water damage have been reported in the main office building. On the second floor there is a nice fireplace and a well stocked bookshelf, which has been destroyed by vandals. The building behind the office holds the laboratory. Scientific instruments and bottles of unknown substances, extensive study logs and samples are found here. Again, due to water damage, the floors are unstable.

Site Analysis

Today, my existing site was once Solvay Coke and Gas. The site is approximately 46 acres and is zoned as heavy industrial. The site is a compilation of numerous sites and a variety of industrial activities have been taking place since 1900 or maybe as early as 1866. (USEPA, 2008)There was coke and gas facility located at the northern edge until 1983. Leather tannery's were located at the southern tip starting business sometime in 1884.

In October 2001, the U.S. EPA, Wisconsin Department of Natural Resources (WDNR), and the City of Milwaukee conducted a site investigation to check for any contaminants on site. When the report of the site investigation was made, it was determined that the site posted a possible threat on human health and safety. Substances found on site were arsenic, cadmium, chromium, copper, cyanide, lead, iron, mercury, benzene, and asbestos containing materials, just to name a few. (USEPA, 2008) These materials were found in old structure on site, pipes, storage tanks, drums, open pits, between walls, underground, and on the surface. The original cleanup order only called for removal of physical objects such structures, pipes, and storage tanks, but not any hazardous material below ground. This causes a problem because runoff from the site has the potential to enter the river and could cause health problems to humans and wildlife. Interviews conducted by the EPA in February 2008, said that many residents explained that there was a high interest in property and would like to see what the next activity on the site will be.

Site Analysis

The existing grid is not a typical setup. As with many cities located on a water front, roads begin to converge toward a center focal point and begin to take different shapes. Having blocks in a community that are not always the plain and boring square gives an advantage to the clever minded. New solutions and different approaches are needed to take up the space. Current textures surrounding the site include a lot of concrete and impervious material. Being dominantly surrounded by heavy industrial usually means more pollution and toxins. On site is compacted earth, toxins left from the Solvay Coke and gas, brick rubble, and deteriorating concrete. The geometric shape of the plot is one of the things that caught my eye when searching for a site. Working with different boundaries gives an opportunity for creative solutions. Topography for the site is that of a typical Fargo project, flat. Inland, topography begins to gain elevation on average of ten percent. The greatest density of topographic changes comes from the existing roads and slopes towards the river. Working between plan and section is necessity for a successful design. The current site will need the most attention when working near the river and need to relate with other elevations on site.

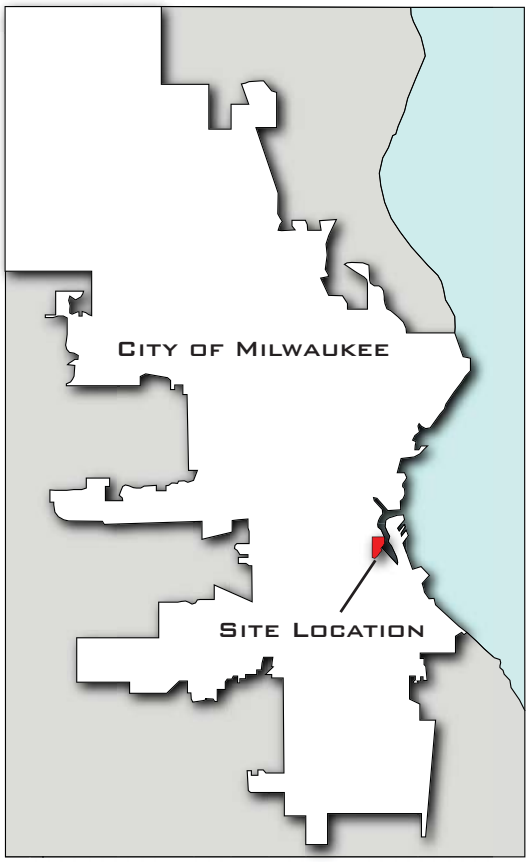
Site Analysis

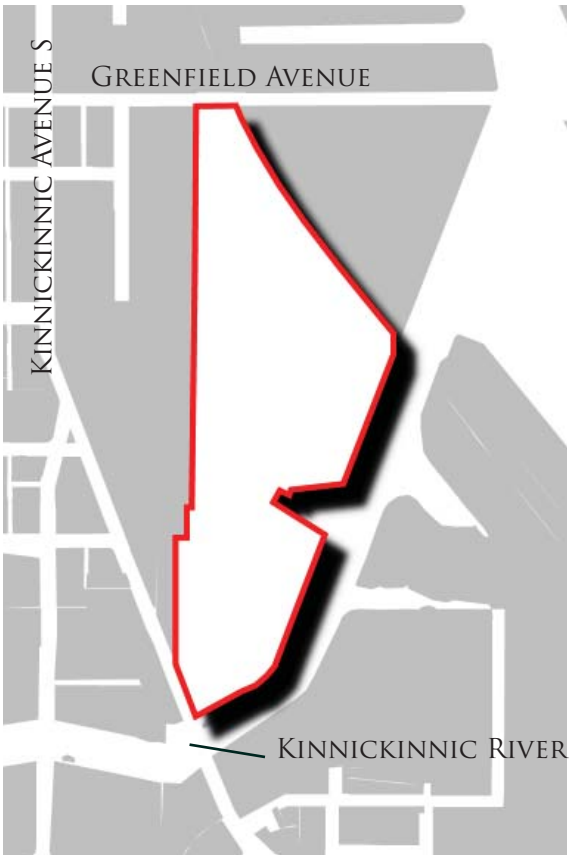
The current buildings on site are in shambles and are causing health and safety issues. Current density to the West where the majority of residential homes are is 25 dwellings per acre. Ample light is allowed to the site for any concerns on plant material selection. Selection of plants will depend highly on sunlight intensity. There is no current vegetation on site due to the toxicity level in the soil. Typical vegetation of the surrounding area is trees in the front yard and shrubs around the house. Three public parks are within one mile of the site so future connections can take place. Water near the current site includes the Milwaukee, Menomonee and Kinnickinnic rivers. These all release into Lake Michigan which is one half mile to the East. The level of pollution with the current research says it is clean enough to be in. Canoe riders and boaters currently use these three rivers. Problems of sedimentation deposits have been reported along the curves of the rivers south of downtown.

When Solvay Coke and Gas Company was still in business, the only people on site would be who were employed. Surrounding residents had no reason to be in the area of the plant. With changes to the sites function, residents may one day again use the site.

Main transportation in the site is by rail road. Greenfield Avenue borders on the Northern edge of the site. Proposed vehicular traffic will include boat access and addition roads or paths into the site. A current problem of the site is poor drainage. Pits left from previous users and compacted soil are causing problems with water draining from the site. Topography changes will need to be made to improve drainage.

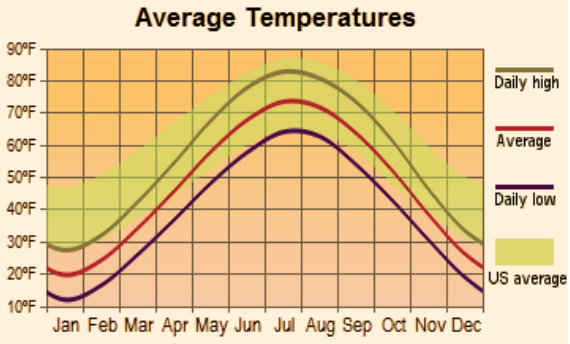
Site Analysis

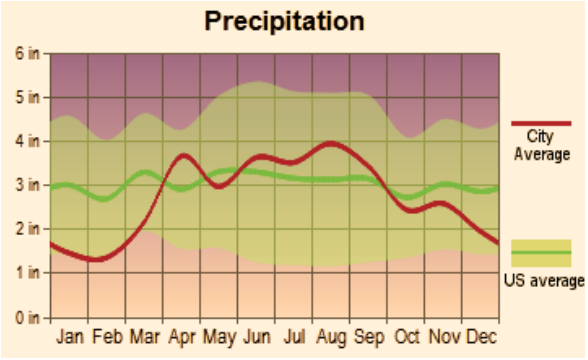


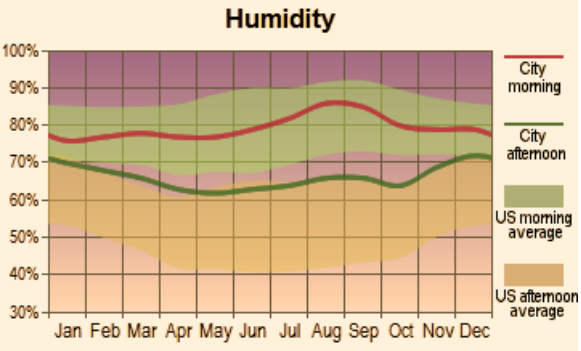


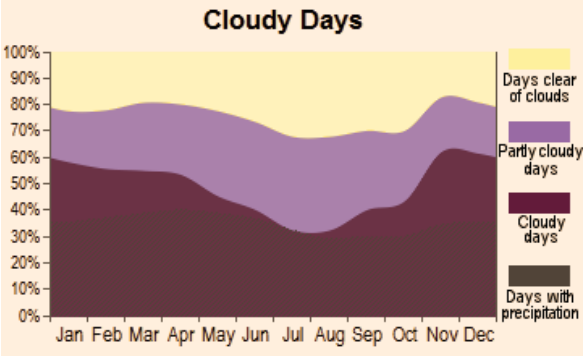
The 46-acre Solvay Coke site is located at 311 East Greenfield Ave. in Milwaukee, Wisconsin. The site is located along the Lake Michigan waterfront in an industrial and commercial corridor that covers more than 700 acres. The nearest residential neighborhood is located about 0.3 mile west of the site. The site is bordered to the north by East Greenfield Ave., to the northeast by railroad tracks and a coal storage area, to the east and south by the Kinnickinnic River, and to the west by railroad tracks. Access to the property is restricted by its relative isolation within the waterfront industrial corridor. In addition, the site is secured by a tall chain-link fence and warning signs. Despite these measures, the site perimeter is not entirely secure, and humans and wildlife could gain access and be exposed to hazardous substances.

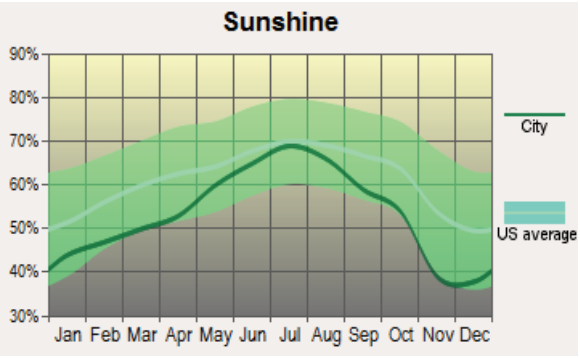
Site Analysis

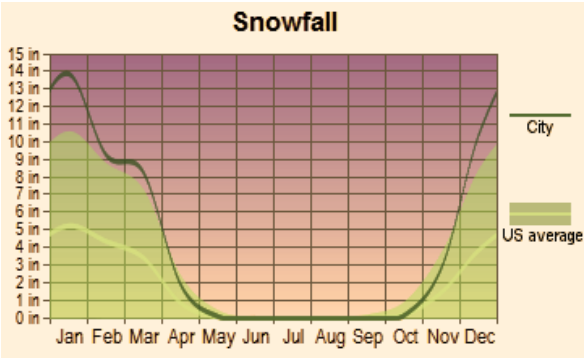


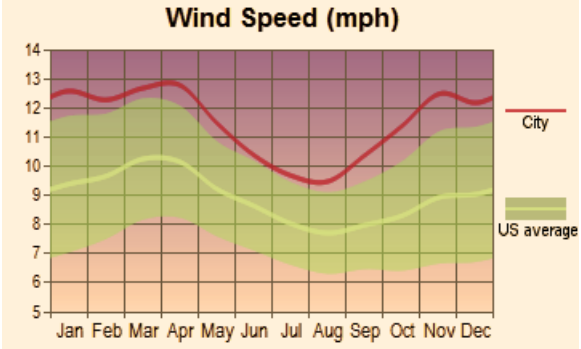






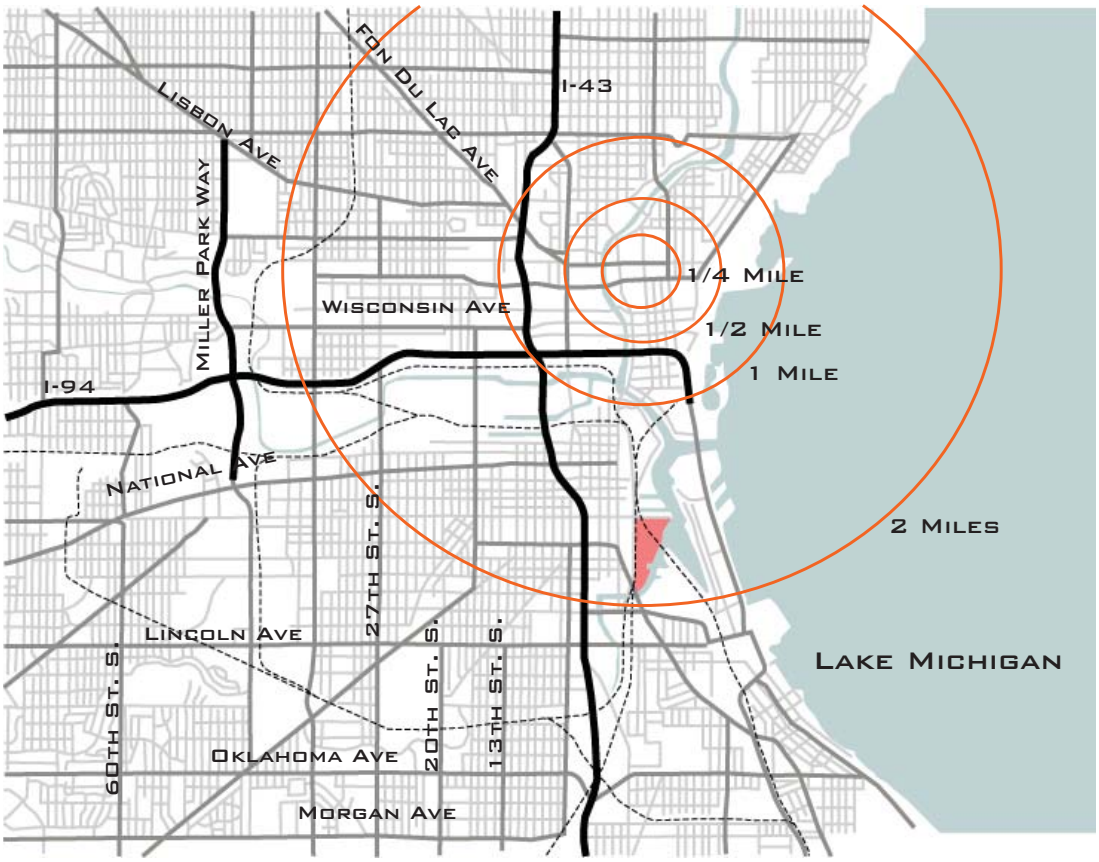






images courtesy of: http://www.city-data.com/city/Milwaukee-Wisconsin.html

Site Analysis



Arterial Streets

Collector Streets

Local Streets

Rail Road

Site Analysis

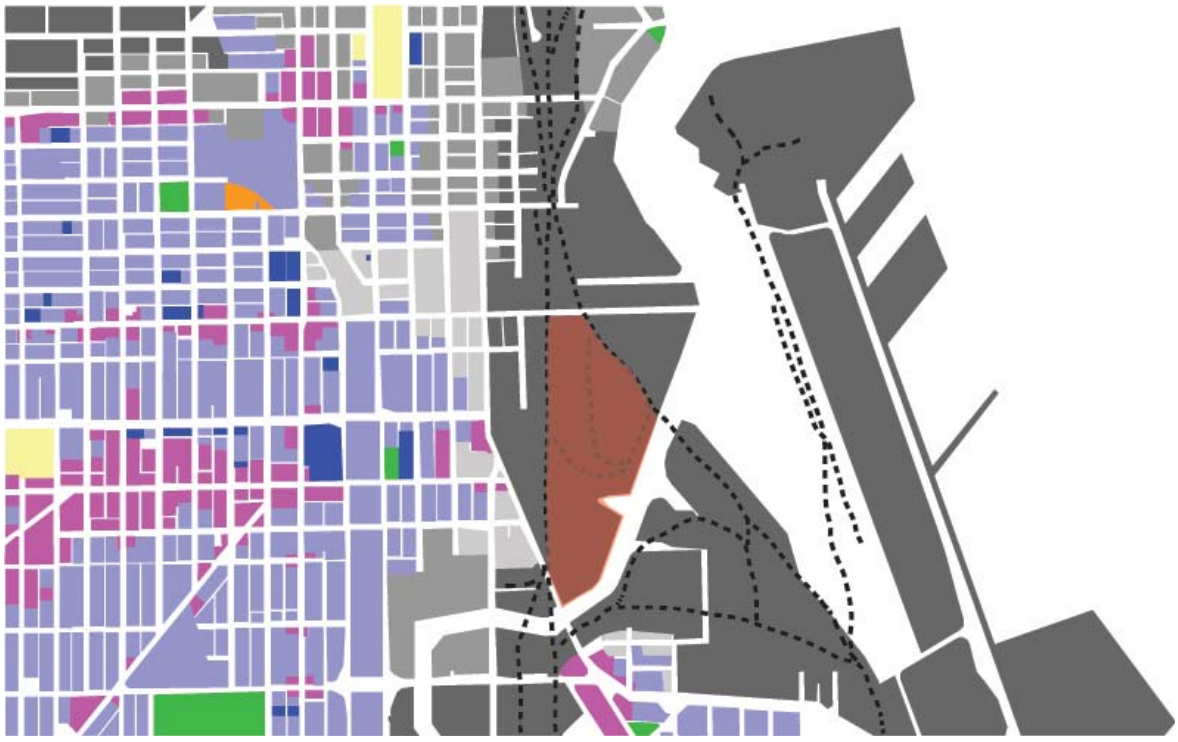
Downtown Street

Residential Zone Street

Street North of site

Industrial Zone Street

Site Analysis



Industrial - Heavy

Industrial - Mixed

Industrial - Light

Parks

Local Business

Institutional

Residential - Two Family

Residential - Multi Family

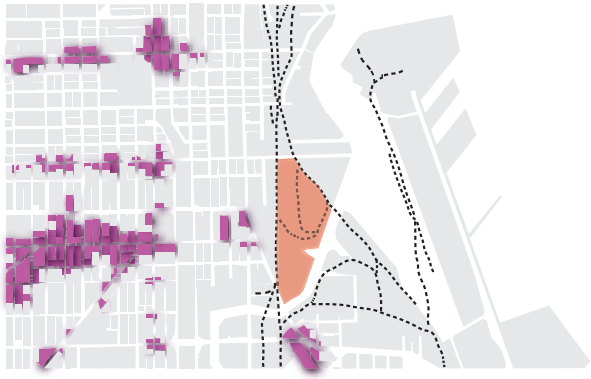
Seeing the residential zones forming towards the site, an accessible park zone with aesthetically pleasing feature can be enjoyed. Using a heavy industrial zone as a park can bring new ideas and viewpoints to residents. Local businesses control a portion of land surrounding the sites and are deteriorating in visual appeal due to the current condition of the road.

Site Analysis

Industrial - Heavy

Industrial - Mixed

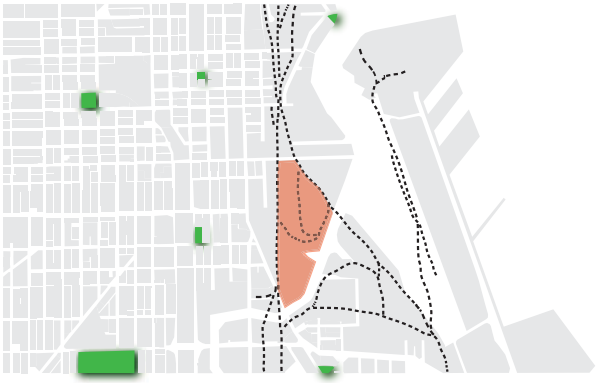
Industrial - Light



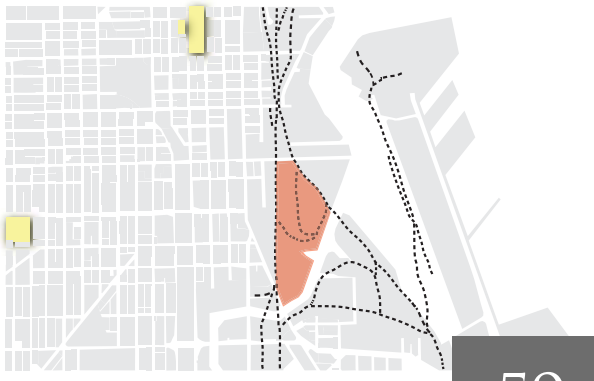
Local Business

Residential - Two Family

Residential - Multi Family



Parks



Institutional

Site Analysis

Residential - Single Family

Residential - Multi Family

Residential Duplex

Transportation/Communications/Utilities

Mixed Commercial and Residential

Manufacturing/Construction/Warehouse

Commercial

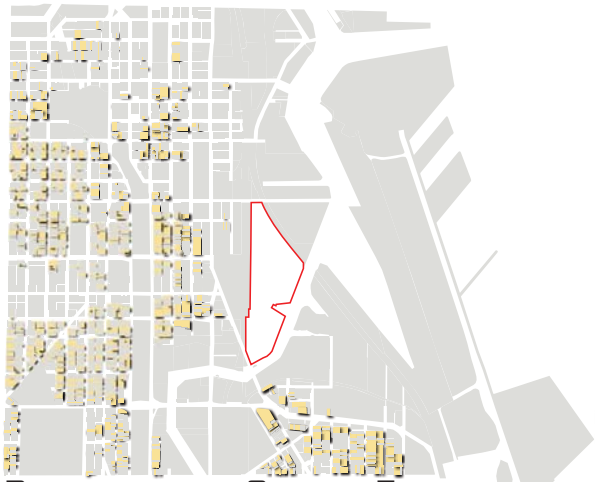
Exempt with Building

Exempt open space

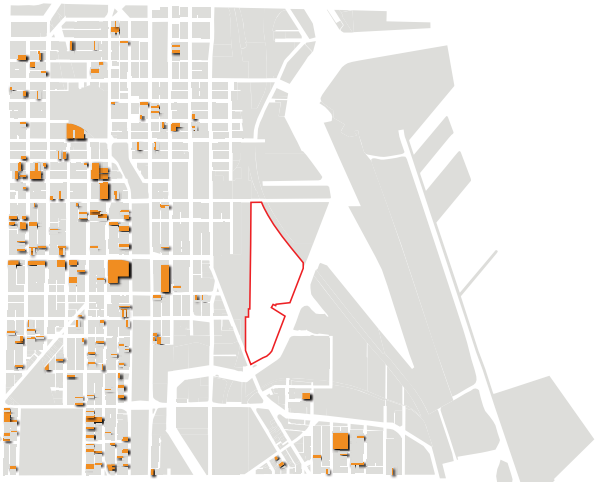
Vacant Land

With the current vacant land, nearby residential neighborhood and poor green space, this land will make a great location for and interactive and educational park. With further development, business may be able to make its way on site and add additional educational aspects.

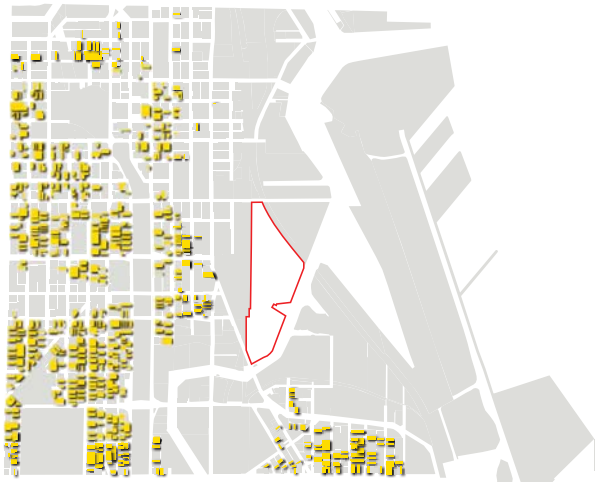
Site Analysis



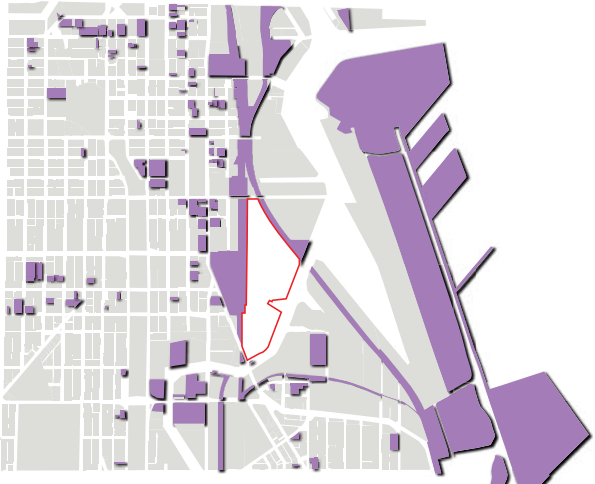
Residential - Single Family



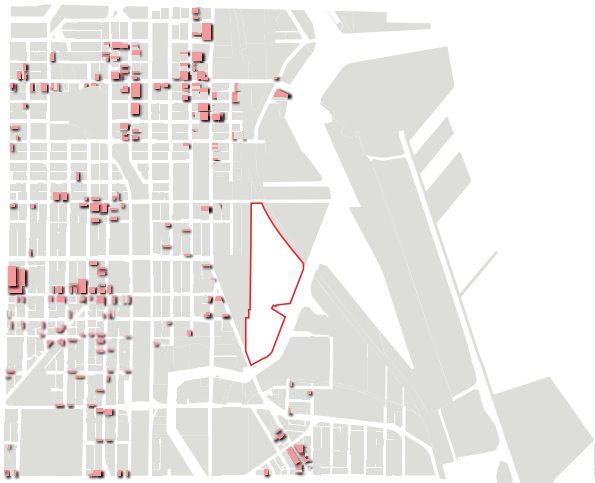
Residential - Multi Family



Residential Duplex



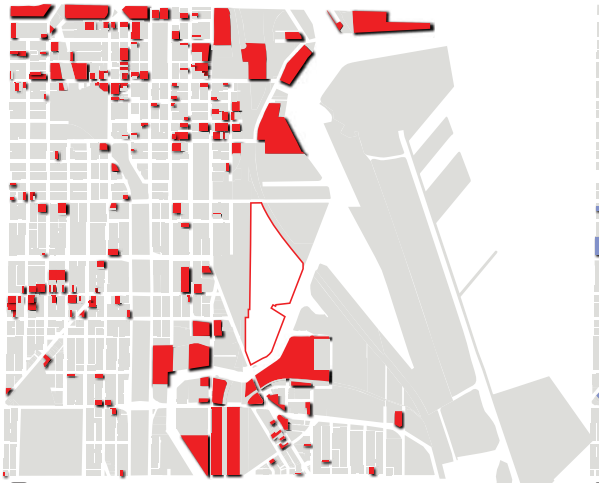
Transportation/Comm./Utilities



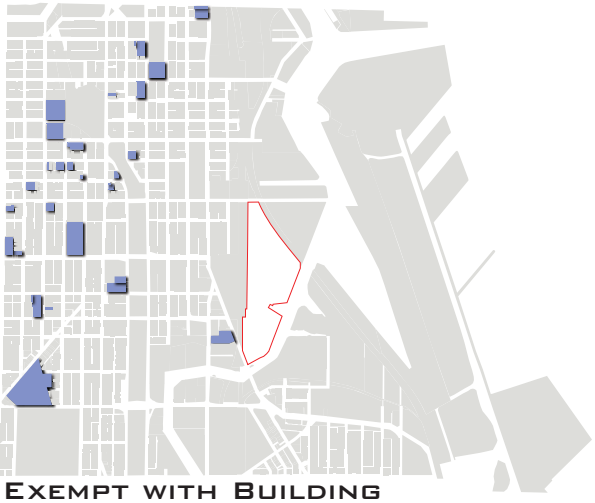
Mixed Commercial and Res.

Manufacture/Const./Warehouse

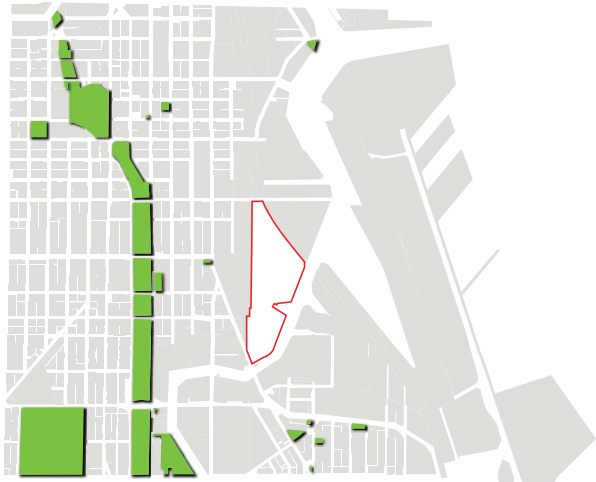
Site Analysis



Commercial



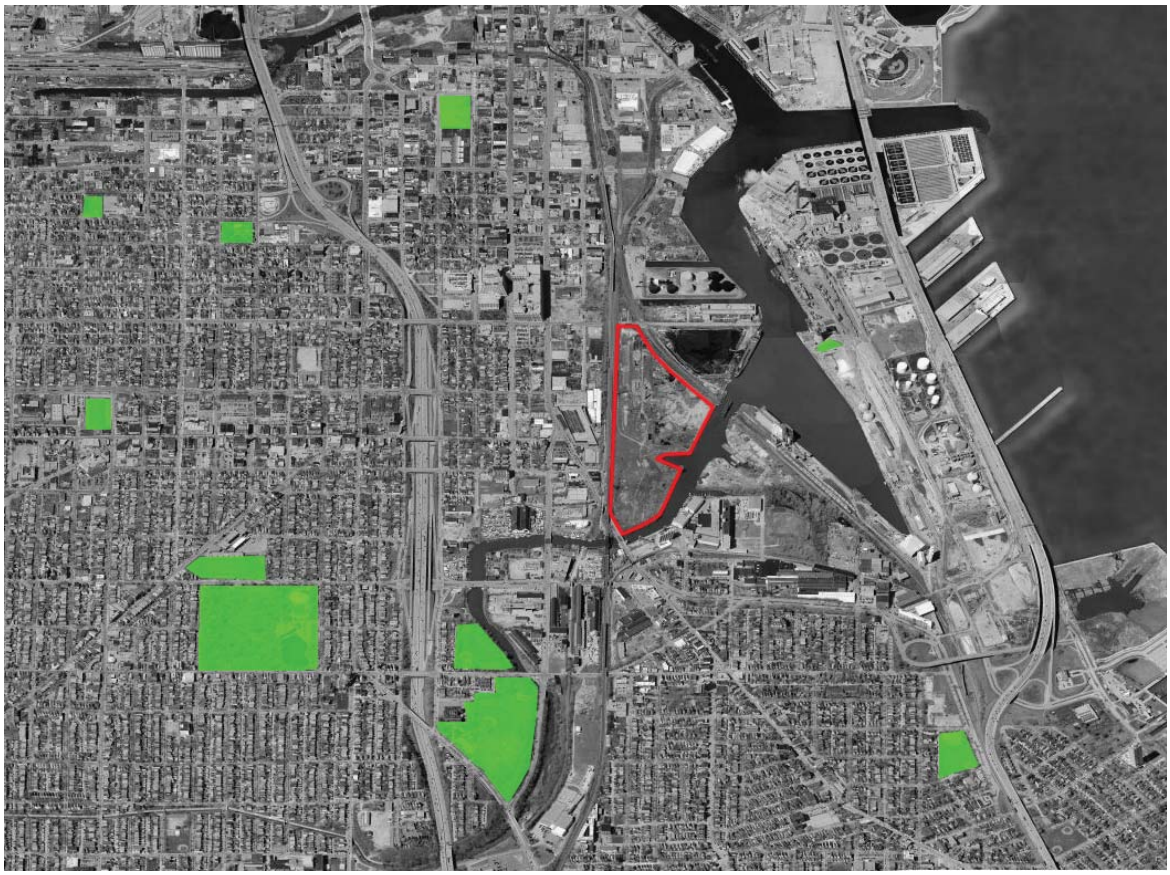
Exempt with Building



Exempt open space

Vacant Land

Site Analysis



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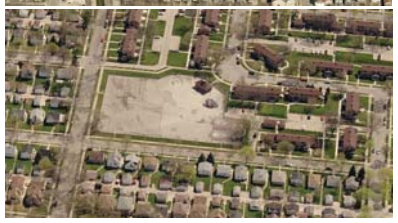

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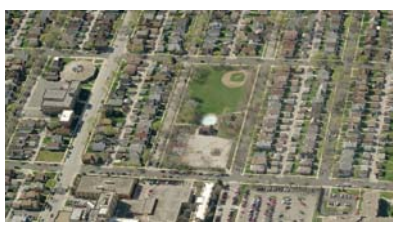
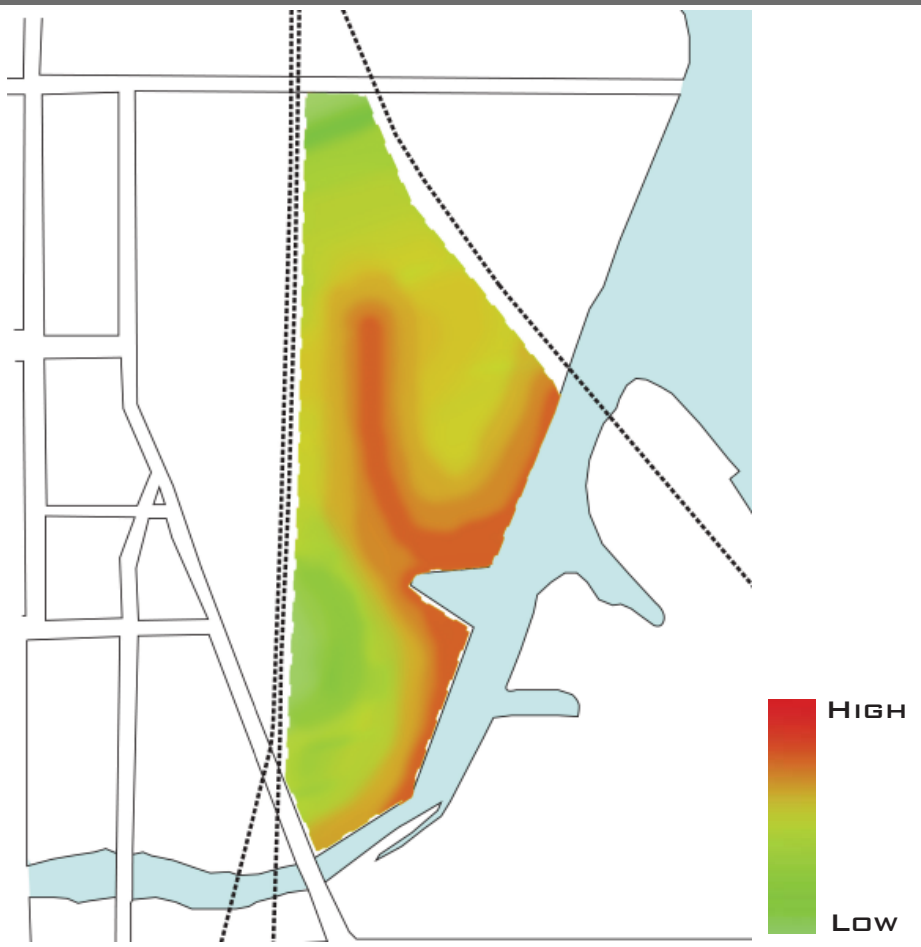


4

Green spaces in the area are either dedicated to sports recreation such as softball, baseball, kickball, etc. Other open green spaces/parks are simply an open patch of turf grass, a small child's playground, and a few trails. A park with an interactive and educational aspect will be a great addition to the green fabric of the area.



On Site

- Cadmium
- Chromium
- Copper
- Lead
- Nickel
- Nitrate
- Sodium hydroxide
- Zinc

Highest Levels

- Copper
- Lead
- Zinc

Most of the PAH contamination from manufactured gas plant sites does not pose an immediate health risk because it is in the form of coal tar buried under soil. If coal tar residue comes in contact with skin, however, it can cause redness or a rash. Eye irritation is another hazard if coal tar residue gets in the eyes.

Related Research

Copper
Affects on the body:

Weakens bones and connective tissue
Slows energy production in the cells
Weakens Immune response rates
Affects the glandular system
Weakens reproductive system
Affects nervous system

Zinc
Affects on the body:

Will interfere with the metabolism and absorption of other essential minerals
Can decrease nutrient levels
Reduce your body's immune function
Reduces your HDL; good cholesterol

Nitrate
Affects on the body:

"Blue Baby Syndrome" Lack of oxygen to infants
Methemoglobinemia; Blood disorder
Cancer

Related Research

Cleanup will take place in the following order to tackle the most important toxins and obstacles first.

-Asbestos containing material present in many of the structures, on piping inside and outside structures, and loose asbestos containing material located on the ground

-Coal tar from the manufactured gas plant operations located in tanks, piping, on the ground, and in an open pit area

-Numerous above ground storage tanks and associated piping containing coal tar and other residues

-Other hazardous substances located throughout the Site such as drums of naphthalene crystals and oil in old electrical transformers. Surface and subsurface contamination not addressed during the removal action remains and is a source of potential exposure to humans and wildlife. In addition, runoff from the Site could contain contaminated surface soil which could migrate off-site and enter the river at various locations. Future development of the property will bring additional people onto the site and increases the potential for exposure to contaminants present in soil, sediment, and groundwater.

Related Research

Phytoremediation is evolving into a cost-effective means of managing wastes, especially excess petroleum hydrocarbons, polycyclic aromatic hydrocarbons, explosives, organic matter, and nutrients. Applications are being tested for cleaning up contaminated soil, water, and air. Different types of phytoremediation include phytoextraction, rhizofiltration, phytostabilization, phytodegradation, rhizodegradation, and phytovolotization.

Phytoextraction

Phytoextraction is the name given to the process where plant roots uptake contaminants from the soil and translocate them to their above soil tissues. As different plant have different abilities to uptake and withstand high levels of pollutants many different plants may be used. Hyperaccumulator plant species are used on may sites due to their tolerance of relatively extreme levels of pollution. Once the plants have grown and absorbed the pollutants they are harvested and disposed of. This process is repeated several times to reduce contamination to acceptable levels.

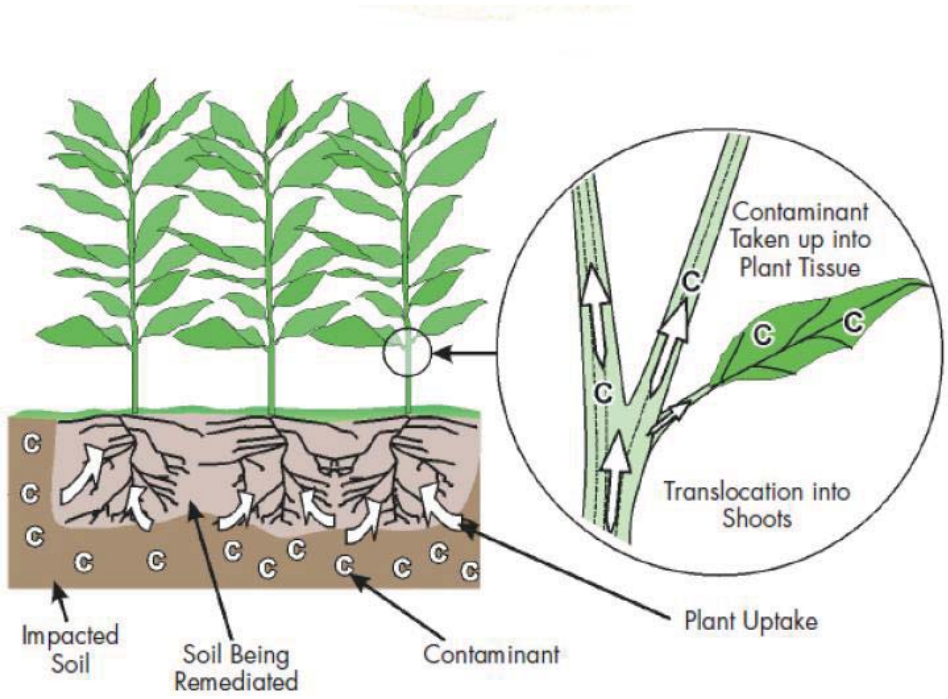
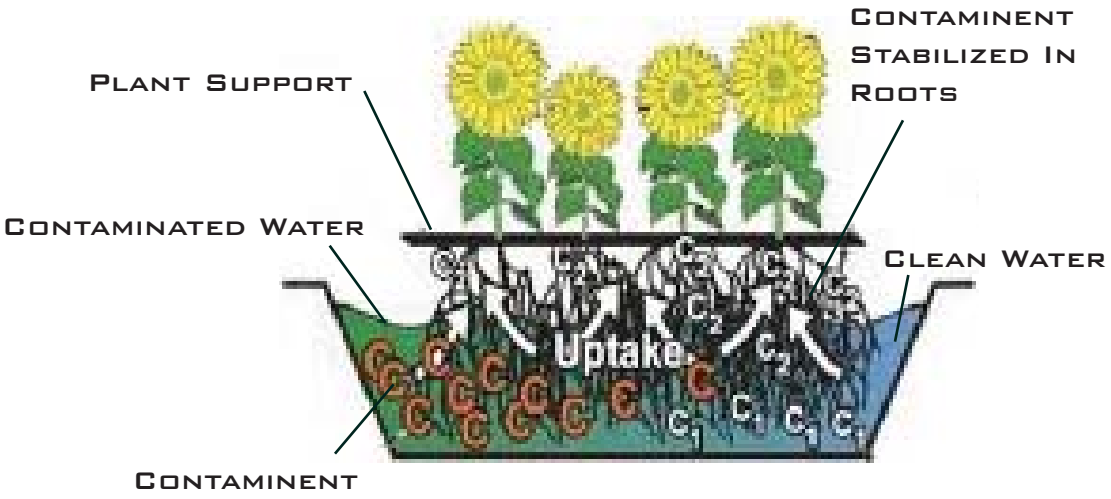


Image provided by: http://www.biology-online.org

Rhizofiltration

Rhizofiltration is concerned with the remediation of contaminated groundwater rather than the remediation of polluted soils. The contaminants are either adsorbed onto the root surface or are absorbed by the plant roots. As the roots become saturated they are harvested and disposed of safely.



Hydroponic System

Image Provided By: http://www. http://systemsbiology.usm.edu

Phytostabilization

Phytostabilisation is the use of certain plants to immobilize soil and water contaminants. Contaminant are absorbed and accumulated by roots, adsorbed onto the roots, or precipitated in the rhizosphere. This reduces or even prevents the mobility of the contaminants preventing migration into the groundwater or air. This technique can also be used to re-establish a plant community on sites that have been denuded due to the high levels of metal contamination. Once a community of tolerant species has been established the potential for wind erosion is reduced and leaching of the soil contaminants is also reduced.

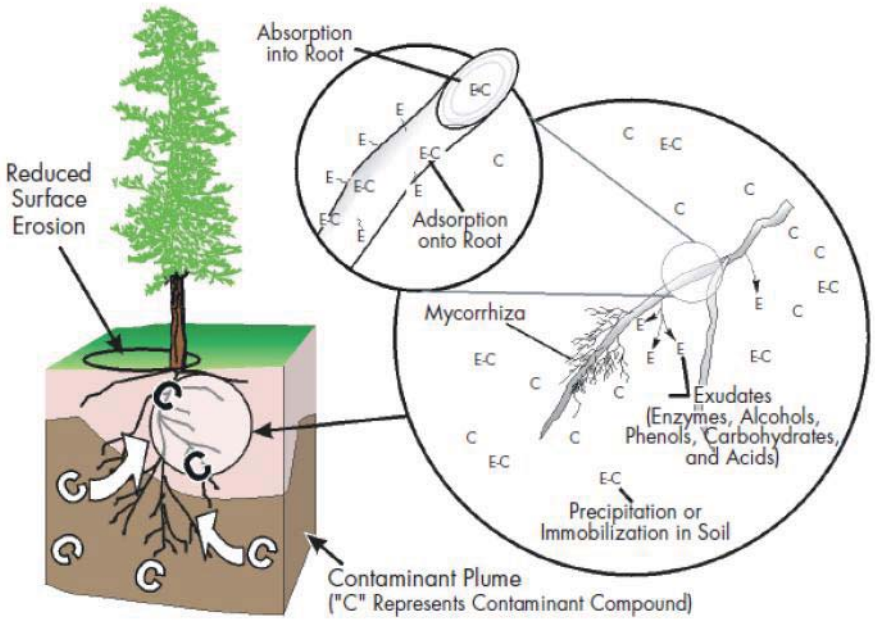


Image provided by: http://www.biology-online.org

Phytodegradation

Phytodegradation is the degradation or breakdown of organic contaminants by internal and external metabolic processes driven by the plant. Some contaminants can be absorbed by the plant and are then broken down by plant enzymes. These smaller pollutant molecules may then be used as metabolites by the plant as it grows, thus becoming incorporated into the plant tissues.

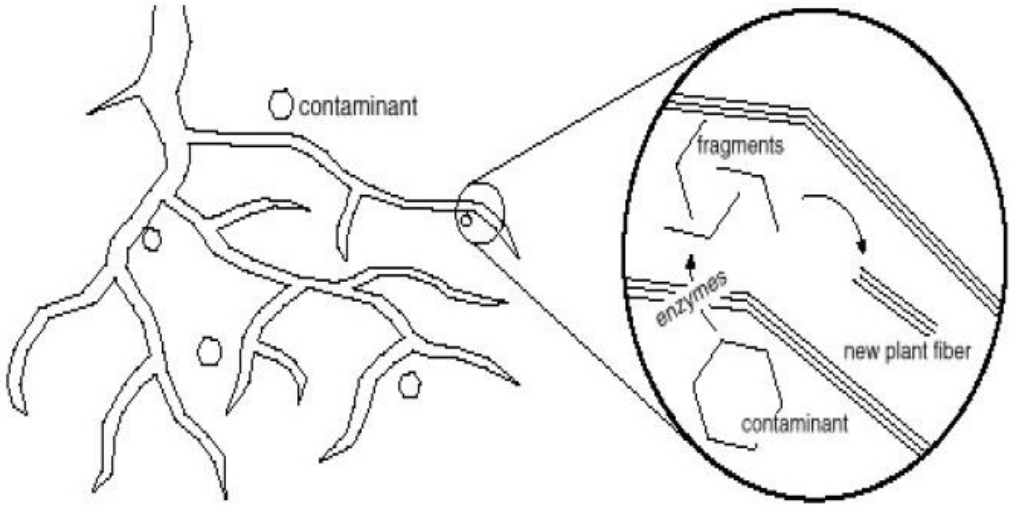


Image provided by: http://www.biology-online.org

Rhizodegradation

Rhizodegradation is the breakdown of organic contaminants in the soil by soil dwelling microbes which is enhanced by the rhizosphere's presence. Plant root exudates such as sugars, alcohols, and organic acids act as carbohydrate sources for the soil microflora and enhance microbial growth and activity.

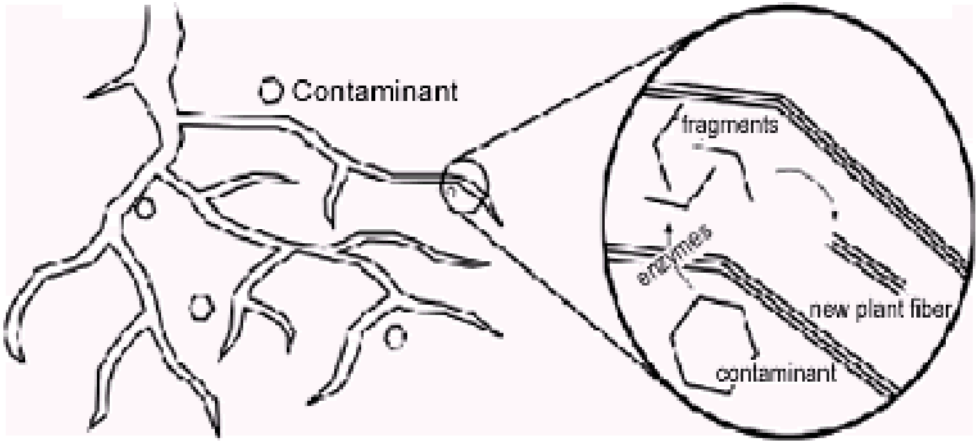


Image Provided By: http://www.unep.or.jp/ietc/publications/freshwater/fms2/2.asp

Phytovolatilization

Phytovolatilization is the process where plants uptake contaminaints which are water soluble and release them into the atmosphere as they transpire the water. The contaminant may become modified along the way, as the water travels along the plant's vascular system from the roots to the leaves, whereby the contaminants evaporate or volatilize into the air surrounding the plant.

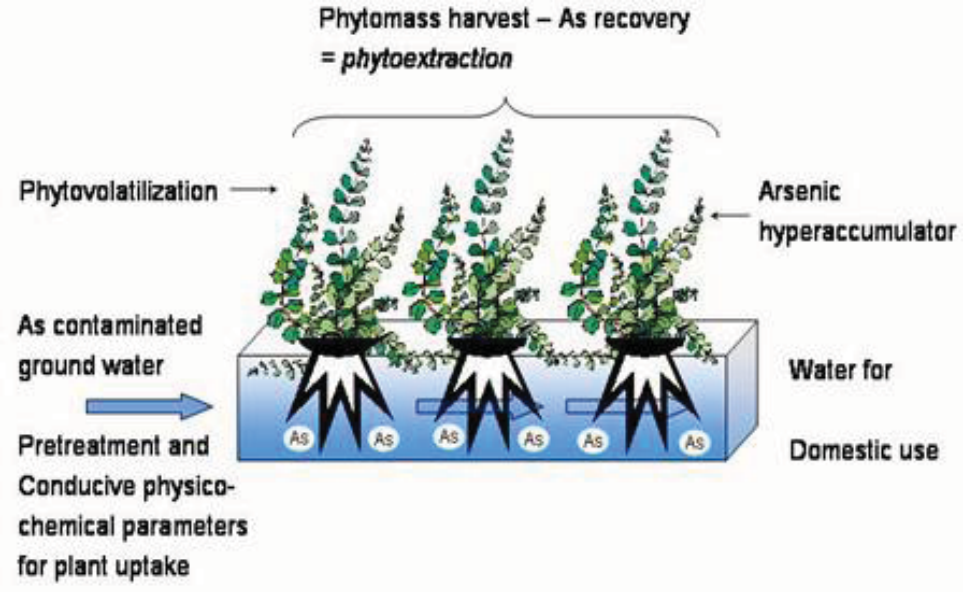


Image Provided By: http://wgbis.ces.iisc.ernet.in/energy/lake2006/programme/programme/proceedings/lc2.htm

Related Research

Indian Mustard - *Brassica juncea*

Lead, Chromium, Copper

Bladder Campion - *Silene vulgaris*

Zinc

Field Chickweed - *Cerastium arvense*

Cadmium

Related Research

Northern Starwort - *Stellaria calycantha*

Cadmium

Yarrow - *Achillea millefolium*

Cadmium

Field Mustard - *Brassica rapa*

Cadmium, zinc

Related Research

Alpine Pennycress - *Thlaspi caerulescens*

Cadmium, zinc, nickel

Water Hyacinth – *Eichhornia*

Copper, zinc

Honey Locust - *Gleditsia triacanthos*

Lead

Related Research

Plains Rough Fescue - *Festuca hallii*

Napthalene – odor used in mothballs- comes from when coal is heated

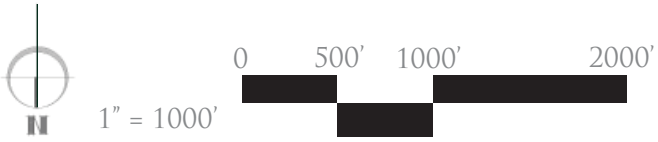
Chives - *Allium schoenoprasum*

Cadmium

Common Bent Grass – *Agrostis capillaries*

Arsenic, Aluminum, Manganese, Lead , Zinc

Design Elements



Mechanism - Rhizofiltration

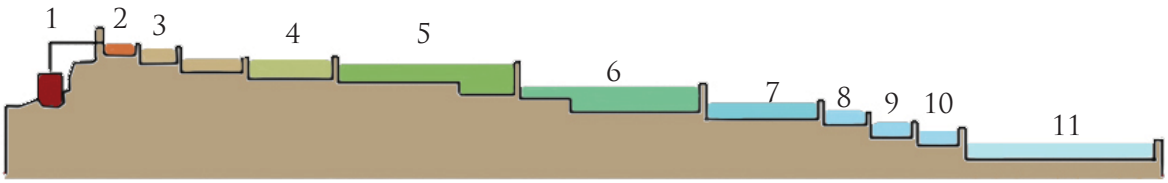
Process Goal - Contaminant Extraction and Capture

Contaminants - Silver, Cadmium, Cesium, Cobalt, Chromium, Copper, Lead, Mercury, Nickel, Strontium, Zinc

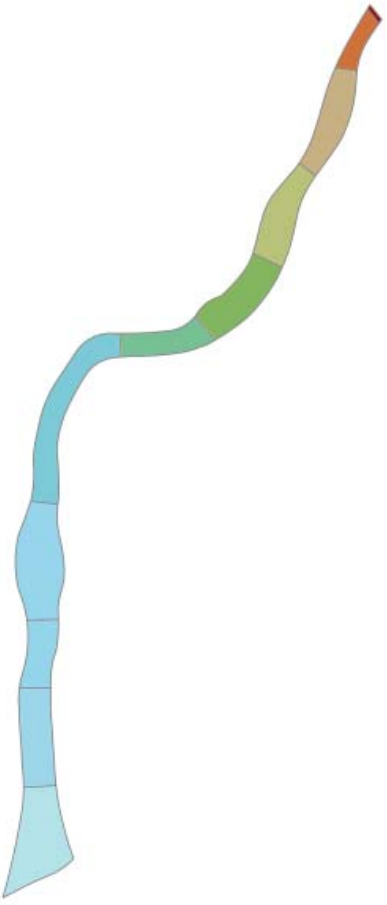
Plants - Alpine Pennycress, Alyssum, Bladder Campion, Chickweed, Common Bent Grass, Field Mustard, Indian Mustard, Hybrid Poplars, Honey Locust, Rough Bent Grass, Spike Bent Grass, Sunflowers, Yarrow

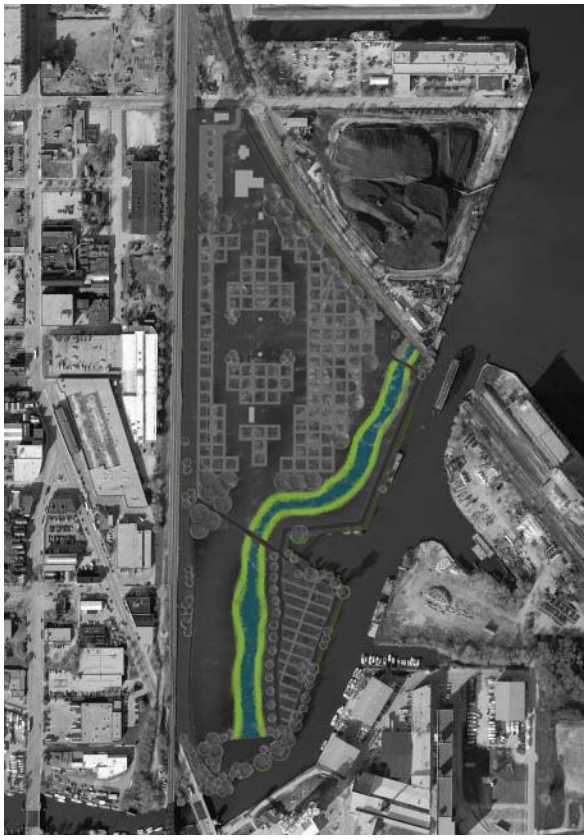
Bioavailable - No

Design Elements

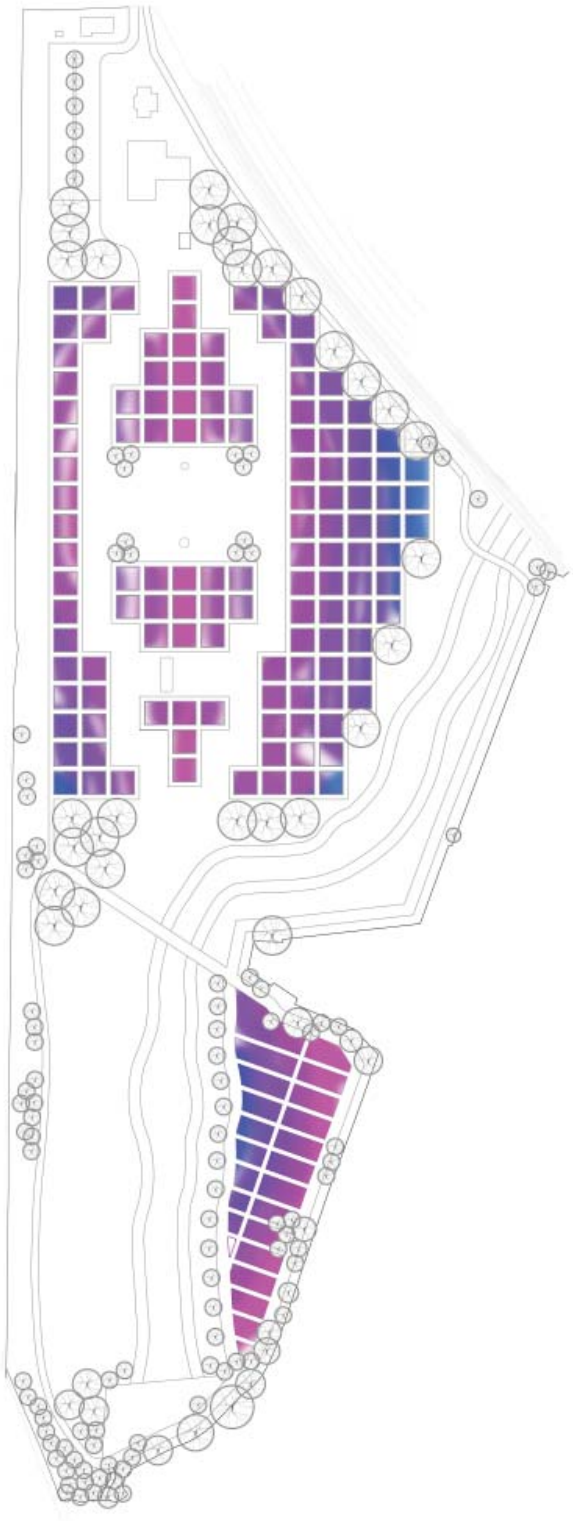


1. Intake and Screening
2. Settling and Precipitation
3. Terraces for Aeration
4. Subsurface Filtration
5. Heavy Metal Removal
6. Pathogen Removal
7. Nutrient Removal
8. Aeration
9. Stabilization
10. Sand Filter
11. Clean Water



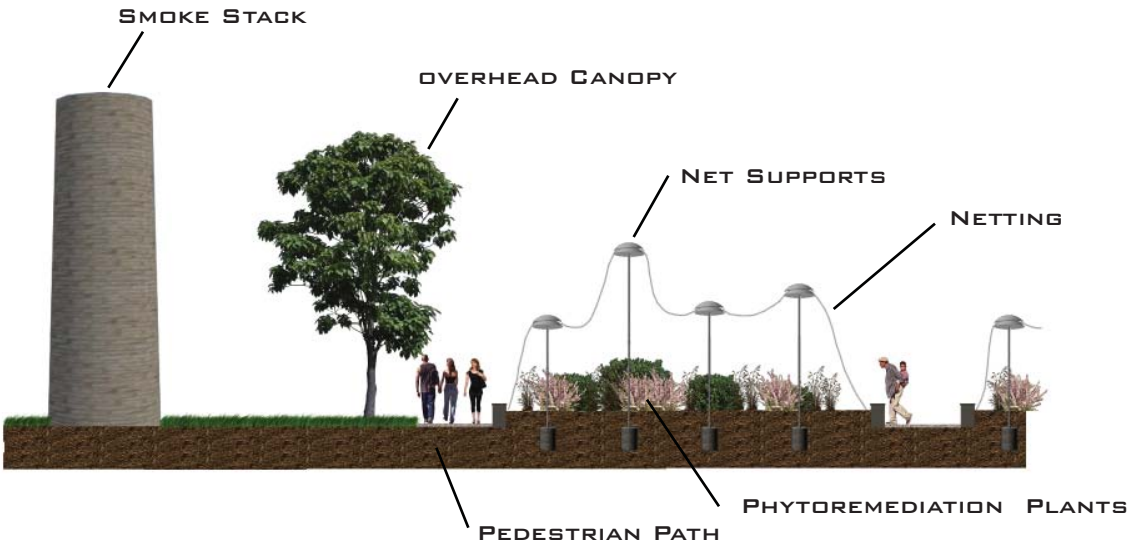


Design Elements



Netting System - Net Heigts

Design Elements



Pedestrian paths will be temporary during the first phytoremediation plan and be made of crushed granite. Overhead canopies will provide shade to users taking in the sites of the plants taking up toxins in the ground. Since the plants inside of the nets leave the toxins bio-available, the netting will have to keep out humans, animals, and insects.

Design Elements

Design Elements

Pedestrians will be able to enjoy the plants either by walking by along the paths or sitting on the ledge surrounding each planted area.

Design Elements

Design Elements

The entrance to the brewery will offer valet parking and other phytoremediation plants that keep the toxins below surface so they do not become bio-available.

Brewery Entrance

Design Elements

Through the pedestrian corridor, users can sit around planters and enjoy the different aromas of various flowers. Extra space during warmer months will allow for farmers markets or other venders to set up their stands.

Design Elements

Water from the northern half of the site will be filtered through a bioswale and connect into the existing wetland. Building along this wetland will be mixed use with first floor retail and above floors residential. First floors will also have patios available for use during warmer months. Nets remaining will show how the site has gone through a cleaning process to be where it is at today.

Design Elements

NTS

After exiting the train stop, visitors will be welcomed by the public library and the two historical smoke stacks used in operation of the old coke refinery. The smoke stacks will be protected on an island surrounded by the bioswale coming from the northern end. A bridge connects the open lawn and the pedestrian corridor.

Bioswale Section

Design Elements

NTS

A section looking south to north. The bioswale protects the plants from being disturbed by users and the nets will keep insects from transferring toxins to other locations.

Bioswale Section

Design Elements

The open lawn in the middle of the pedestrian path can be converted to a skating rink during winter months for prolonged use. Additions to the brewery will allow for extra outdoor seating.

PERSONAL INFORMATION

North Dakota State University has been a great place to learn. Fellow classmates and students will all be missed when going to new and exciting things with my education from NDSU.

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